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elements" by L. E. Dickson, 167-179; "Pseudocanonical forms and invariants of systems of partial differential equations" by A. L. Nelson, 180-197; "Arithmetical paraphrases (II)" by E. T. Bell, 198-219; "On the zeros of solutions of homogeneous linear differential equations" by C. N. Reynolds, Jr., 220-229; "A generalization of the Fourier cosine series" by J. L. Walsh, 230-239; "Polynomials and their residue systems" (to be continued) by A. J. Kempner, 240-266.

UNIVERSITY BULLETIN, Louisiana State University, new series, volume 13, no. 2, February, 1921: *Fundamental Aspects of Mathematical Training* by S. T. Sanders, 30 pages [First paragraph: "The tendency is outstanding in secondary education to exclude from courses of study the subject that does not have 'value in relation to other topics and to time involved.'"¹ "The ideal of practicality has now entered the schools with telling force. It has been manifested in its demand for vocational training, and it is reconstructing the older cultural training by eliminations and additions. Materials once accepted without question when schools had a margin of energy are now displaced by the pressure of new demands."² "But the meaning of the practical is not that of the eighteenth century. Arithmetic now represents tools which the child needs to control his present and potential quantity situations"³"].

UNTERRICHTSBLÄTTER FÜR MATHEMATIK UND NATURWISSENSCHAFTEN, volume 27, February 26, 1921: "Die Bedeutung der nichteuklidischen Geometrie für den Elementar-Unterricht" by A. Schülke, 3-6; "Rechentafel zur Auflösung zweier Gleichungen ersten Grades mit zwei Unbekannten" by P. Luckey, 8-9; "Das grösste einem gegebenen Kreisabschnitte eingeschriebene Rechteck und die grössten einem gegebenen Kugelabschnitte eingeschriebenen Kreiszyylinder," by —. Friese, 9-11; "Zur Konstruktion des grössten Rechtecks in einem Kreissegment" by W. Gaedecke, 11-12; "Grenzwerte symmetrischer Verbindungen der Winkelfunktionen am Dreieck" by A. Emmerich, 12.

ZEITSCHRIFT FÜR MATHEMATISCHEN UND NATURWISSENSCHAFTLICHEN-UNTERRICHT, volume 52, nos. 1-2, February 17, 1921: "Ein Weg zur Relativität für die Schule" by A. Schoenflies, 1-13; "Zur Theorie der komplexen Zahlen" by W. Schwan, 13-17; "Graphische Behandlung der Zinsrechnung" by A. Schülke, 17-19; "Für und wider das abgekürzte Rechnen" by K. Becker, 19-24; "Zur Reform des mathematischen Hochschulunterrichts" by E. Kamke, 24-26; "Die Möbiussche Form des Brechungsgesetzes" by R. Böger, 27-31; "Eine Bemerkung zum d'Hondtschen Wahlverfahren" by —. Behmann, 32-34; "Der Lehrsatz des Pythagoras als Sonderfall eines Höhensatzes" by A. Maennersdoerfer, 35-36; "Die Winkelmessung des Babyloniers, des Artilleristen, und des Mathematikers" by P. Luckey, 36-37; "Aufgabenrepertorium," 38-41; "Ueber den Nichtgebrauch und den Missbrauch der Mathematik bei den Begabten-prüfungen" by M. Vaerthing, 41-46; "Bücherbesprechungen," 46-55.

UNDERGRADUATE MATHEMATICS CLUBS

All reports of club activities should be sent to E. L. Dodd, 3012 West Ave., Austin, Texas

CLUB ACTIVITIES.

THE MATHEMATICS CLUB OF HUNTER COLLEGE, New York City.

[1918, 187.]

Prior to October, 1919, meetings were held monthly, as follows:

January, 1919: "Sun dials" by Anita Rosenthal '19.

March: Reception to freshmen.

April: "Prominent mathematicians of the present day" by Edith Gaddis '21;

"Paper folding," under the direction of Anita Rosenthal '19.

May: "Perfect, amicable, square, and triangular numbers" by Laura Guggenbuhl '22.

¹ "Bulletin, 1920, No. 1, U. S. Bureau of Education."

² "High School Mathematics," by G. W. Evans, Headmaster of Charleston High School."

³ "Bulletin, 1917, No. 10, U. S. Bureau of Education."

In October, 1919, a reorganization of the club was effected with a view to placing all responsibility for the success of the club upon the student members. In November the following officers were elected: President, Melanie Rohrer '20; vice-president, Helen Myer '20; secretary, Helen Deaken '20; treasurer, Charlotte Warnock '21, publicity manager, Edith De Hondt '20, faculty adviser, Marcia Latham, instructor.

December: Catch problems, brought by volunteers and discussed by the club.

Members were invited to drop further solutions in the Mathematics Club mail box.

Since the reorganization, the arrangement is to have three afternoon meetings each semester, the first one being purely social. In addition, two regular meetings a month are held during the noon recess hour. Outside speakers are invited each semester. Recently a "Problem Chapter" has been formed with Laura Guggenbuhl '22 in charge for the discussion and solution of problems too technical for the regular meetings. Frequent reference is made to the problems published in the MONTHLY. The following are the topics of meetings held during 1920.

January 10, 1920: "Scales of notation" by Laura Guggenbuhl '22 and Helen Myer '20.

February 23: "Magic squares" by Eva Thornton '22.

March 8: "Card tricks" by Mary Bailey '21.

March 23: "The fourth dimension" by Anna Colligan '21, Jessie McCormick '22, and Sarah Block '22.

April 5: Book reviews by Monica Gilloran '21, Edna Dramer '23, Charlotte Warnock '21, and others.

May 17: Election of officers: President, Catherine Cronin '21; vice-president, Mary Bailey '21; secretary, Dora Aronoff '21; treasurer, May Warnock '22; publicity manager, Sarah Karnis '22; faculty adviser, Marcia Latham, instructor.

October 4: "Geometrical fallacies" by Margaret Cronin '21.

November 1: "The use of the slide rule in the business world" by Sarah Mones '21.

November 15: "Business calculations in the middle ages" by Laura Guggenbuhl '22, Jessie McCormick '22, and Sarah Block '22, with lantern slides shown by Professor Lao Simons.

December 6: A demonstration of calculating machines by Mr. O'Brien, of the Dalton Adding Machine Company.

December 24: Christmas Party.

A red letter day during 1920 was a special afternoon meeting addressed by Professor David E. Smith on the teaching of mathematics in the junior high schools.

The average attendance at the noon meetings has been forty and that at the afternoon social meetings one hundred. A special effort has been made to make the social meetings popular and at the same time keep the flavor of a mathematics club. The following are some special features of different meetings: Miss Polly

Gon, the magician, who divined ages, numbers on a blackboard visible to the audience but concealed from her, throws of dice, and so forth; at another meeting the chief entertainment was a contest based on the following puzzles devised by Beatrice Meyer '22. Each of these is a mathematical term when translated: 1. $C +$ to possess something = ———; 2. To make an attempt $+$ to fish = ———; 3. A parrot $+$ part of the verb *to go* = ———; etc.; students sometimes furnish original songs, which together with more familiar ones, such as "Euclid had a little book" and "Every little symbol has a meaning all its own" are sung at the close of the meetings. The club has a special bulletin board for announcements, clippings, special problems, etc.

(Report by Miss Aronoff.)

THE WHITE MATHEMATICS CLUB AT THE UNIVERSITY OF KENTUCKY, Lexington, Ky.

[1918, 90, 451; 1919, 309.]

The following are programs of recent meetings of the Club.

May 7, 1919: "Monge's solution of the non-integrable complete differential equation" by Professor J. M. Davis.

May 12: "Class and one-to-one correspondence" by Frank Tuttle '20.

May 20: "Review of nilpotent algebras generated by two units, i and j , such that i^2 is not an independent unit" by Dr. G. W. Smith, instructor.

May 26: "Some linkages considered analytically" by Harvey Pettitt Gr.

June 2: "Applications of vector analysis to the theory of helices" by William Elliott Gr.

September 30, 1919: Election of officers: President, Professor Davis; secretary, Dr. Smith.

October 7: Report of mathematics meetings held at Ann Arbor, Michigan, September 2-5, 1919, by Dr. Smith.

October 14: "Quadratic transformations" by Professor P. P. Boyd.

October 21: "Discontinuities" by William Elliott Gr.

October 28: "Tests of mathematical ability" by Professor Davis; "The Committee on Mathematical Requirements" by Professor Boyd; "The coefficient of correlation" by Dr. Smith.

November 4: "To draw a circle tangent to three given circles by means of inversion" by W. E. Armentrout Gr.

November 12: "Determination of the angular velocity from the accelerations of non-collinear points of a rigid body" by Professor E. L. Rees.

November 18: "Some angles of the right triangle" by Frances Kimbrough '20.

November 25: "Singular case of conics" by Professor H. H. Downing.

December 2: "Paper folding" by Frank Tuttle '20.

December 9: "Introduction to the theory of statistics" by Dr. Smith.

December 16: "Bolshevism in mathematics" by Professor Rees.

February 17, 1920: "Wireless telegraphy" by Ernest Baulch '21.

February 24: "Quadratic transformations" by Professor Boyd.

- March 2: "Magnus's transformations" by Jesse Osborn Gr.
 March 9: "Some peculiar functions" by Dr. Smith.
 March 16: "Some propositions about circles proved by means of properties of the radical axes" by W. E. Armentrout Gr.
 March 23: "Taylor and Taylor's series" by Professor Downing.
 March 30: "Some properties of integral numbers" by Frances Kimbrough '20.
 April 6: "Quadratic transformations, Steiner's method" by Jesse Osborn Gr.
 April 13: "Discussion of the preliminary report of the Committee on Mathematical Requirements."
 April 27: "Bohr's picture of the atom" by Professor W. B. Angel, physics department.
 May 11: "Cubic and quartic curves with a line of symmetry" by Professor Rees.
 May 20: "The mathematical theory of investment" by Dr. Smith.
 October 20, 1920: "A geometric proof of a theorem concerning the roots of a quartic" by Professor Rees. Election of officers: President, Professor Rees; secretary, Dr. Flora E. Le Stourgeon, instructor.
 October 26: "Derivatives from the expansion of the function" by Professor Downing.
 November 2: "Conversion of series into continued fractions" by W. E. Armentrout Gr.
 November 11: "Functions of lines" by Dr. LeStourgeon.
 November 16: "Curve tracing" by L. P. Rippey Gr.
 November 23: "Applications of mathematics to economics" by W. E. Payne, instructor.
 November 30: "The trisection of an angle and the duplication of a cube" by D. C. Duncan '22.
 December 7: "Differential equations (Review of Bateman's *Differential Equations*)" by Professor Davis.
 December 14: "Theory of the slide rule" by Nelson Conkwright '22.
 January 13, 1921: "The Hessian, the Steinerian, the Cayleyan" by Professor Boyd.
 January 18: "Curve tracing" by Professor Rees.
 February 14: "Some properties of the logarithmic functions" by Professor Downing.
 February 23: "Some ancient methods of computation" by Professor Boyd; "Two mathematical paradoxes" by Professor Downing; "Mathematics and religion" by Professor Davis.
 March 2: "Stieltjes's integrals and linear functionals" by Dr. LeStourgeon.
 (Report by Dr. LeStourgeon.)

PI MU EPSILON FRATERNITY (INC.), Syracuse University, Syracuse, N. Y.
 [1918, 271.]

Officers for the year 1919-20 were as follows: Director, Mrs. Mary Harwood, instructor; vice-director, J. J. Hopfield, instructor in physics; secretary, Mary

Hutchinson '20; treasurer, Edward Houghtaling '21; librarian, Marion Jarvis '20.

During the college year six meetings were held, a Christmas party, and a picnic. One graduate student and twelve undergraduates were elected members. A chapter at Ohio State University was established. The programs were as follows:

November 10, 1919: "Travels through France" by Professor W. H. Metzler;

"Graduate work at the University of Edinburgh" by Dr. J. J. Nassau.

December 1: "The region at infinity" by Dr. T. S. Yang.

February 23, 1920: "Some new equations in graduations" by Dr. Nassau.

April 19: "The theory of relativity" by Dr. Nassau.

May 10: "On some special curves" by Edna Lawrence '20.

(Report by Dr. Nassau.)

THE PASCAL CIRCLE OF TRINITY COLLEGE, Washington, D. C.

[1920, 425.]

The officers for the year 1920-21 are as follows: President, Margaret Walsh '21; vice-president, Elizabeth Herbert '22; secretary and treasurer, Margaret Kelly '23; faculty adviser and honorary president, Professor Marie C. Mangold. October: The name, purpose, and requisites for membership of the society were explained by the president. Recreational problems in geometry were presented.

November: "The value of mathematics to the physiologist and physician"¹ by Elizabeth Herbert '22. At this meeting it was decided to make the discussions of the year hinge on the relation of mathematics to the various other sciences, and to have three members appointed at each meeting to bring in recreational problems for the next meeting.

December: "Why automobiles skid" by Frances McFadden '23; "The relation of Mathematics to English" by Lillian Manganero '22. This refuted the frequent charge that skill in one excludes skill in the other.

(Report by Miss Walsh.)

THE JUNIOR MATHEMATICAL CLUB, University of Wisconsin, Madison, Wis.

[1918, 188, 457; 1920, 224.]

The present officers are as follows: President, Phillip Dowling '21; vice-president, Gretchen Votteler '21; secretary and treasurer, Alice N. Tucker '22.

The programs for the past year are as follows:

January 22, 1920: "Integers" by Professor E. B. Skinner.

February 26: "Graphical calculations" by Professor Arnold Dresden.

March 11: "Mathematics in physics" by Harold Laird '22 and Phillip Dowling '21.

March 25: "What is a wave?" by Professor C. S. Schlichter.

¹ A paper by Professor H. B. Williams, with a title similar to this, was delivered before the Mathematical Association of America (1920, 95-97) in December, 1919. The main part of the paper was published in *Mathematics Teacher*, March, 1920.—EDITOR.

April 8: "Geometric probabilities" by Dr. Florence Allen, instructor.
 April 22: "Squaring the circle" by Professor W. W. Hart.
 May 27: Election of officers; annual reports.
 October 28: "The semi-regular solids of Archimedes" by Professor E. B. Van Vleck.
 November 11: "Mathematics and logic" by Professor Dresden.
 December 2: "Methods of mathematics" by Victor Von Szelski.
 December 16: "Wave motion" by Professor Schlichter.
 January 13, 1921: "Expansion of fundamental laws of algebra" by Professor Skinner.
 January 27: "The value of π " by Grace Desimval '21.
 February 24: "Interesting applications of the theory of probability" by Professor Max Mason.

(Report by Miss Tucker.)

PROBLEMS AND SOLUTIONS.

EDITED BY B. F. FINKEL, OTTO DUNKEL, AND H. P. MANNING.

Send all communications about Problems and Solutions to B. F. FINKEL, Springfield, Mo.

PROBLEMS FOR SOLUTION.

[N.B. Problems containing results believed to be new, or extensions of old results are especially sought. The editorial work would be greatly facilitated if, on sending in problems, proposers would also enclose any solutions or information that will assist the editors in checking the statements. In general, problems in well-known text-books, or results found in readily accessible sources, will not be proposed as problems for solution in the MONTHLY. In so far as possible, however, the editors will be glad to assist members of the Association with their difficulties in the solution of such problems.]

2920. Proposed by N. P. PANDYA, Sojitra, India.

Construct a triangle, having given the base, the angle between the base and the median on it, and the difference of the remaining two sides.

2921. Proposed by J. W. CLAWSON, Ursinus College, Pa.

ABC is a triangle cut by a transversal PQR , so that A, P ; B, Q ; and C, R are opposite vertices of a complete quadrilateral. Draw CD, PF, QE , chords in the circles circumscribing, respectively, triangles ABC, BRP, AQR , all these chords being parallel to AB .

Prove that (i) D, E, F are collinear; (ii) the line DEF passes through the Wallace point of the quadrilateral (the point of concurrency of the circles mentioned above); (iii) the line DEF intersects AB at the point of tangency to AB of the parabola which touches the four sides of the quadrilateral.

2922. Proposed by the late A. M. KENYON.

A telephone engineer desires the general solution of the following differential equation:

$$x \frac{d^2y}{dx^2} + \frac{dy}{dx} = \sqrt{\frac{a}{y}}.$$

2923. Proposed by C. N. SCHMALL, New York City.

The corner of a page of a book is turned down in such a manner that the triangle formed has a constant area. Show that the locus of the corner is an oval of the curve,

$$r^2 = a^2 \sin 2\theta.$$